

Indicator 5.23:

U.S. Forest Sustainability Indicators <https://www.fs.fed.us/research/sustain/>

Total forest product carbon pools and fluxes

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What is the indicator and why is it important?

Harvested wood products (HWP) are an important carbon (C) pool arising from timber harvested on forest land and woodlands. Similar to forest ecosystems, C in HWP in use (e.g., paper, lumber for building) can accumulate for long periods of time, in excess of 100 years for solid wood used in single and multifamily housing, alteration and repair of housing, and other end-uses. In other cases, such as paper products in use, the C stored in that material may be discarded a few years after production. Solidwood and paper products may be burned, which returns the C to the atmosphere in the year of that activity (see Indicator 5.24 for information on C emissions associated with forest biomass utilization for energy). These products may also be recycled, which returns the wood to a product in use. The HWP may also be discarded in solid waste disposal sites (SWDS; i.e., dumps or landfills) and that material may be subject to decay and/or a portion may be stored permanently, depending on the type of SWDS. Storage of C in HWP in use and in SWDS delays or reduces C emissions. Use of HWP can also reduce emissions, especially if they substitute for products with higher C emission processes (e.g., cement) – substitution is not considered in the results presented in this Indicator. As domestic forest biomass is harvested, carbon is shifted from forest ecosystems to forest products in use or in landfills. The rate of carbon accumulation is determined by the mix of products and uses (e.g., the lumber used in housing versus the paperboard used in boxes) and by patterns of disposal, recycling, and landfill management. This indicator shows the HWP contribution to the combined system of annual CO₂ emissions and removals by forests and products.

This indicator primarily applies the production approach to track the HWP contribution, one of three commonly

used approaches to report the HWP contribution under the United Nations Framework Convention on Climate Change. The other major approaches are stock change and atmospheric flow. The production approach tracks C accumulation estimates in wood that was harvested in the United States, including C held in products that are exported. Harvested wood products contributions are also shown for the stock change approach, which tracks carbon stock changes in the United States, and the atmospheric flow approach, which tracks net carbon exchange with the atmosphere.

What does the indicator show?

Under the production approach, the net HWP contribution from forest products in use and in landfills in 2018 was -99 million metric tons (MMT) CO₂ equivalent (Eq.), or about 15 percent of the total annual C flux by forest ecosystems. The annual contribution decreased about 56 percent from the 1990 level to the low point occurring during Great Recession in 2008. Since 2008 it has increased 81 percent. The overall change from 1990 to 2018 is a drop of 20 percent. This long-term decline is primarily due to decreasing harvests of U.S. timber as well as partial replacement of domestically harvested products with imported ones.

Under the stock change approach, the annual net HWP contribution increased until about 2005 with increasing imports, then declined rapidly following the onset of the 2008 recession. HWP contributions rebounded after the economic recovery and under this approach, there has been an estimated increase of 16 percent since 1990 (fig. 23-1).

Under the production approach, net additions to C storage have been greater to SWDS than for products in use (fig.

23-2). Note that storage in SWDS is mostly stable over time, while additions to products in use vary greatly with changes in economic conditions, harvesting, and primary product mixes, among other factors.

The total annual carbon stored in HWP as a percent of total carbon stock in forests and products has increased since 1990 from 3.5 to 4.5 percent (fig 23-3). This increase in share is primarily due to increasing wood carbon stock in landfills. In 2019, total carbon stored in forest products in use and in landfills under the production approach equaled nearly 9,800 MMT CO₂ Eq. (fig 23-3).

What has changed since 2010?

The annual contributions of HWP in SWDS showed a small but steady increase of 9 percent from 2010 (-61.7 MMT CO₂ Eq.) to 2018 (-67.2 MMT CO₂ Eq.). The contributions of products in use increased substantially since the Great Recession from -7.4 MMT CO₂ Eq. in 2010 to -31.5 MMT CO₂ Eq. in 2018. This more than 3-fold increase in the transfer of C from forest land to products in use can be attributed to market demand for solidwood and paper products, primarily from housing construction. These trends in the contribution of HWP in the land sector C sink are expected to continue if current economic conditions persist.

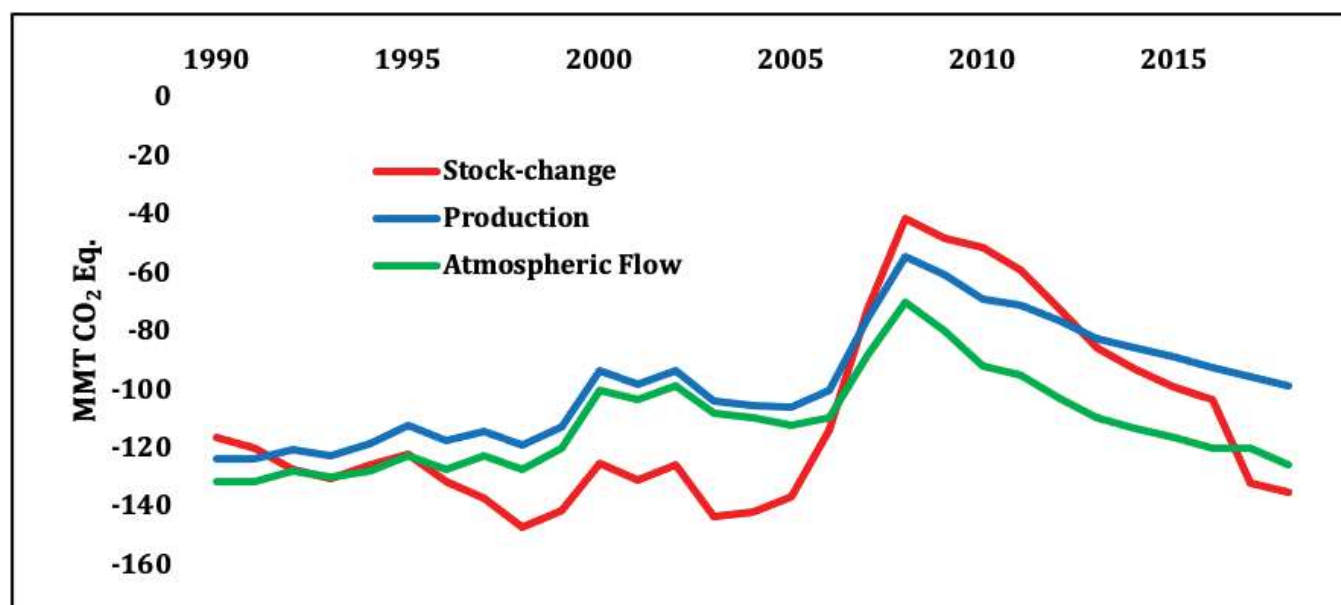


Figure 23-1—Annual contribution of HWP to CO₂ removals under the three accounting approaches, 1990 to 2018 (MMT CO₂ Eq.). Negative estimates indicate a net transfer of C from the forest land category.

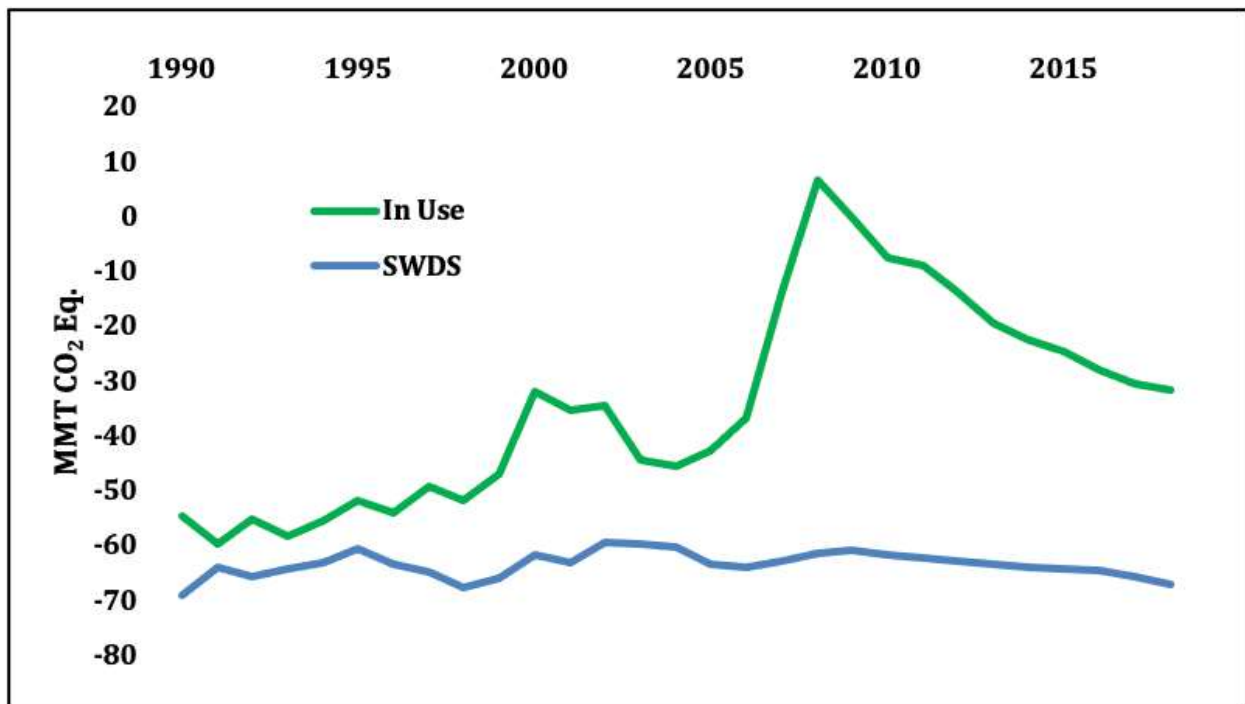


Figure 23-2— Net additions in HWP per year by location of storage—in use and in SWDS, 1990–2018 MMT CO₂ Eq. Negative estimates indicate a net transfer of C from the forest land category.

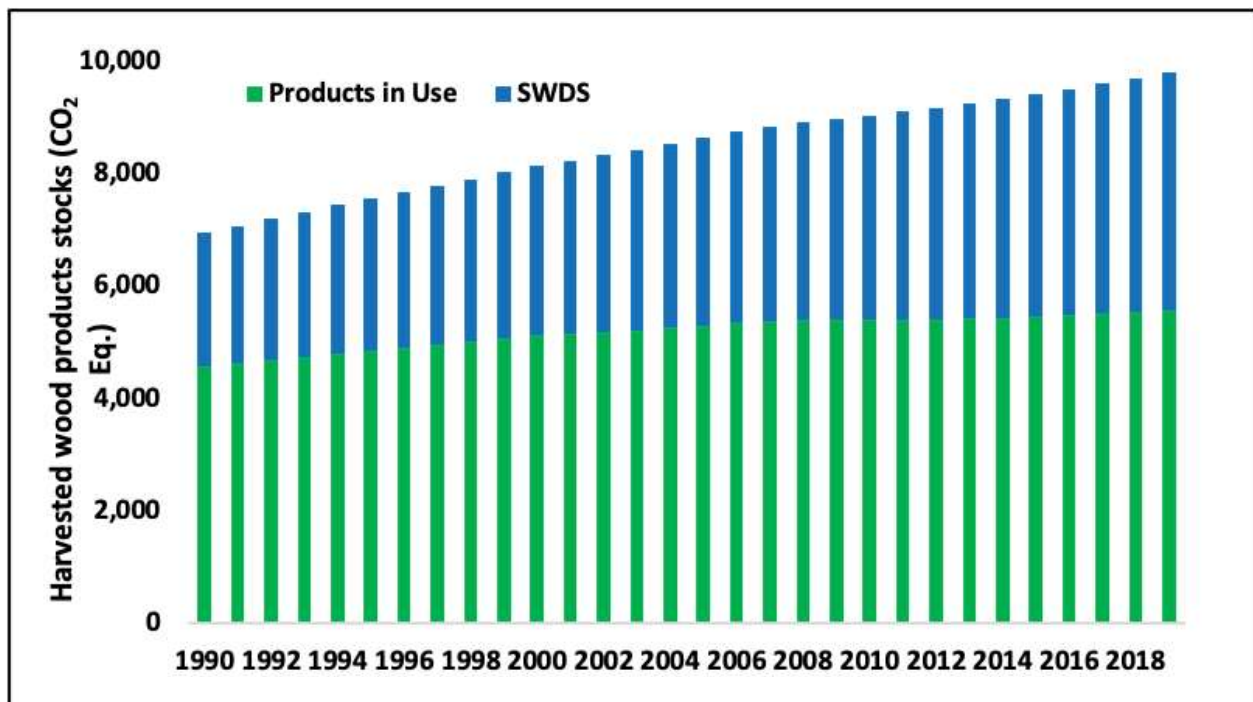


Figure 23-3—Harvested wood products stocks —in use and in SWDS, 1990–2018 MMT CO₂ Eq.